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PART II IGNEOUS ROCKS

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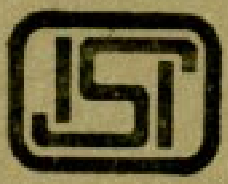

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SYMBOLS AND ABBREVIATIONS FOR USE IN GEOLOGICAL MAPS, SECTIONS AND SUBSURFACE EXPLORATORY LOGS

PART II IGNEOUS ROCKS

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Indian Standard

SYMBOLS AND ABBREVIATIONS FOR USE IN GEOLOGICAL MAPS, SECTIONS AND SUBSURFACE EXPLORATORY LOGS

PART II IGNEOUS ROCKS

0. FOREWORD

0.1 This Indian Standard (Part II) was adopted by the Indian Standards Institution on 2 April 1974, after the draft finalized by the Subsurface Exploration Sectional Committee had been approved by the Civil Engineering Division Council.

0.2 In all spheres of engineering construction, data on the nature of the geological formations constituting the foundations are indispensable. Often, the data are given on maps or in geological sections using symbols and abbreviations. Geological maps and sections are also required for other activities, such as mining and mineral prospecting. Such maps and sections are, therefore, being prepared by various agencies in the country. In the absence of any standard for the guidance of the engineering geologist or engineer, different symbols and abbreviations are being used by different agencies, resulting in entirely different representations of the same geological data. The data collected and presented by one agency for a particular purpose is often useful to other agencies investigating for a different job. It, therefore, becomes essential for all agencies to follow the same practice. This standard has been prepared to fulfil this need.

0.2.1 This standard (Part II) deals with igneous rocks while other parts are as follows:

Part I Abbreviations

Part III Sedimentary rocks

Part IV Metamorphic rocks

Part V Line symbols for formation contacts and structural features

0.3 The symbolization of rock types is based on the principles laid down by the International Organization for Standardization. For the rock types to be covered for symbolization, classification of igneous rocks as adopted by United States Bureau of Reclamation for engineering purposes has been used.

0.4 In the formulation of this standard due weightage has been given to international co-ordination among the standards and practices prevailing in different countries in addition to relating it to the practices in the field in this country.

0.5 For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test, shall be rounded off in accordance with IS : 2-1960*. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1. SCOPE

1.1 This standard (Part II) covers symbols for igneous rocks for use in geological maps, sections and logs of bore holes, test pits, exploratory drifts and shafts for river valley projects. Rock types covered in the standard are restricted to those commonly met with in engineering practice.

2. BASIC PRINCIPLES OF SYMBOLIZATION

2.1 In order to represent a type of rock on a map or on a plan, the corresponding surface should be covered by the symbols representing the rock in question. The surfaces occupied by rocks of different types should be separated by a continuous thin line if in nature there is a clear demarcation between the different types.

2.2 The graphic symbols should be used in black and white for the representation of rocks and minerals. Additional letter symbols may be used to designate other characteristics like age.

2.3 There is a great variety of rocks and it is impossible to have an individual symbol for each of the rock types that are found in nature. For this reason the symbols are developed for the most important and frequently occurring rock types. For listing the rock types one of the simpler systems used for classification of rocks has been followed; however the tables of symbols for rock types are not meant to provide a standard system of classification. The symbolization is based on the following principles:

a) In order to characterize the properties of rocks, elementary symbols are chosen, which should:
   1) be as simple as possible and, therefore, easily traceable;
   2) express the nature of the rock; and
   3) be of such a dimension that several elementary symbols can be placed next to each other.

*Rules for rounding off numerical values (*revised*).

b) Principal rock types are represented by the juxtaposition of several identical elementary symbols; the variations of the above are shown by the addition of the elementary symbols which characterize the principal constituents.

c) In order to characterize the loose form of rock, symbols should be arranged with no determined order; a systematic staggered arrangement should represent the consolidated form of a rock.

d) The individual elements or the rows of symbols should be arranged either parallel to the stratification of foliation where applicable or parallel to the margin of the map or the geological formation under portrayal, as found convenient. The procedure adopted should be indicated on the plan.

2.3.1 The basic symbols given in this standard should not be used for other representations. Within the framework of these principles, symbols for other rocks not covered in this standard may be developed and intimation may be made to the Indian Standards Institution. Similarly for any characteristic not represented by a symbol, a new symbol may be chosen.

3. GRAPHIC SYMBOLS FOR IGNEOUS ROCKS

3.1 Basic Symbols — The basic symbols of the principal types of igneous rocks are given in Table 1.

3.2 Symbols for Rock Types

3.2.1 For developing symbols for different rock types from these basic symbols the following points should be kept in view:

a) A distinction in the grain size of rocks may be shown by the smaller or greater size of the basic symbols.

b) To indicate porphyritic texture the basic symbol is replaced at intervals by a larger symbol of the same type.

c) The symbols representing plutonic rocks are derived from a cross  or the letter  ; for volcanic rocks, the basic symbol chosen is a right angle placed on its point  The symbols for feldspathoidal rocks are always asymmetrical 

d) In the symbols for alkaline rocks with the exception of feldspathoidal rocks, an open space is always left at the point of intersection of the lines  .

TABLE 1 BASIC SYMBOLS OF THE PRINCIPAL TYPES OF IGNEOUS ROCKS

(*Clause* 3.1)

	Plutonic Rocks				Volcanic Rocks			
Sl No.	Rock Group	Group Symbol	More Differentiated Rock Types	Symbol	Rock Group	Group Symbol	More Differentiated Rock Types	Symbol
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1)	Alkali-granite				Alakali-rhyolite			
2)	Very acid granite				Leucorhyolite			
3)	Granite		Normal granite		Rhyolote		Rhyolite	
			Granodiorite				Rhyodacite	
			Quartz-diorite				Dacite	
4)	Syenite		Alkali-syenite		Trachyte		Alka li trachyte	
			Syenite				Trachyte	
			Monsonite				Latite	

5)	Diorite				Andesite			
6)	Gabbro		Gabbro		Basalt			
			Norite					
			Anorthosite					
7)	Feldspathoidal plutonic rocks		Nepheline-syenite		Feldspathoidal volcanic rocks		Phonolite	
			Essexite/Thera-lite				Feldspathoidal basalt	
			Ijolite					
8)	Ultra basic rock				Pikrite Pikrite-basalt			

e) To indicate the very acid character of a rock, a point is placed at the centre of the symbol, the lines being interrupted around the point of intersection 

f) With increasing basicity, the lines are thickened so that the darker appearance of the rock is reflected in the symbol.

g) The various types of ultrabasic rocks may be represented by the greater or lesser length of lines in relation to the black square 

3.2.2 The symbols for different rock types commonly met with in engineering practice are given in Table 2. Symbols for rock types not given in Table 2 may be developed using the basic symbols given in Table 1 on the basis of the principles laid down in **2** and **3.2.1**.

3.2.3 Where features are too small for graphical representation either an asterisk may be given against the feature and explained in the legend or the name of the rock written out.

TABLE 2 SYMBOLS FOR IGNEOUS ROCK TYPES

(Clause 3.2.2)

ESSENTIAL MINERALS: FELDSPARS	ALKALI FELDSPARS PREDOMINATE			ALKALI AND SODA-LIME FELDSPARS ABOUT EQUAL		SODA-LIME FELDSPARS PREDOMINATE					Some alkali feldspar may occur	FELDSPARS ABSENT	
CHIEF FELDSPARS IN ROCK													
SODA-LIME FELDSPARS IN NORMAL ROCK	OLIGOCLASE TO ANDESINE (WHERE ALBITE IS PRESENT, PREFIX "ALKALI" IS USED)		ALBITE	OLIGOCLASE TO ANDESINE		OLIGOCLASE AND ANDESINE		LABRADORITE, BYTOWNITE AND ANORTHITE		ANDESINE TO BYTOWNITE	SOME SODA-LIME FELDSPAR MAY BE PRESENT	SOME SODA-LIME FELDSPAR MAY CONSTITUTE UPTO 10% OF ROCK	
Other minerals whose presence is necessary or whose virtual absence is characteristic + Signifies presence in significant amounts - Signifies virtual absence	+ QUARTZ (> 5%)	- QUARTZ (< 5%)	NEPHELINE OR LEUCITE (-QUARTZ)	+ QUARTZ (> 5%)	- QUARTZ (< 5%)	+ QUARTZ (> 5%)	- QUARTZ (< 5%)	- OLIVINE	+ OLIVINE	+ LEUCITE OR + NEPHELINE	+ NEPHELINE OR + LEUCITE OR + ANALCITE	- NEPHELINE - LEUCITE - OLIVINE + PYROXENE OR + HORNBLENDE	- NEPHELINE - LEUCITE + OLIVINE + PYROXENE
TYPICAL MODES OF OCCURRENCE													
VOLCANIC — Uniform or irregular beds, deposits or accumulations of volcanic ejectamenta	RHYOLITE ASH RHYOLITE BRECCIA RHYOLITE TUFF RHYOLITE AGGLOMERATE	TRACHYTE ASH TRACHYTE BRECCIA TRACHYTE TUFF TRACHYTE AGGLOMERATE	PHONOLITE + OR LEUCITE PHONOLITE ASH PHONOLITE OR LEUCITE PHONOLITE BRECCIA PHONOLITE OR LEUCITE PHONOLITE TUFF PHONOLITE OR LEUCITE PHONOLITE AGGLOMERATE	QUARTZ LATITE (DELLENITE) ASH QUARTZ LATITE (DELLENITE) BRECCIA QUARTZ LATITE (DELLENITE) TUFF QUARTZ LATITE (DELLENITE) AGGLOMERATE	LATITE (TRACHYANDESITE) ASH LATITE (TRACHYANDESITE) BRECCIA LATITE (TRACHYANDESITE) TUFF LATITE (TRACHYANDESITE) AGGLOMERATE	DACITE ASH DACITE BRECCIA DACITE TUFF DACITE AGGLOMERATE	ANDESITE ASH ANDESITE BRECCIA ANDESITE TUFF ANDESITE AGGLOMERATE	BASALT ASH BASALT BRECCIA BASALT TUFF BASALT AGGLOMERATE	OLIVINE BASALT ASH OLIVINE BASALT BRECCIA OLIVINE BASALT TUFF OLIVINE BASALT AGGLOMERATE	TEPHRITE OR BASANITE ASH TEPHRITE OR BASANITE BRECCIA TEPHRITE OR BASANITE TUFF TEPHRITE OR BASANITE AGGLOMERATE			
Surface flows; shallow small intrusives	ACIDIC GLASSES AND RARE PHONOLITIC GLASSES OBSIDIAN — PERLITE — PUMICE — PITCHSTONE			INTERMEDIATE GLASSES OBSIDIAN — PUMICE — SCORIA				BASIC GLASSES SCORIA — VARIOLITE — TACHYLITE			ULTRA BASIC GLASSES		
Surface flows, shallow dykes, sills, sheets, marginal zones of hypabyssal intrusives	RHYOLITE FELSITE	TRACHYTE	PHONOLITE OR LEUCITE PHONOLITE	QUARTZ LATITE (DELLENITE)	LATITE (TRACHYANDESITE)	DACITE	ANDESITE	BASALT (Rarely porphyritic) DIABASE	OLIVINE BASALT OLIVINE DIABASE	TEPHRITE	NEPHELINITE LEUCITITE NEPHELINE BASALT LEUCITE BASALT	AUGITITE	LIMBURGITE PICRITE PICRITE BASALT MELILITE BASALT
HYPABYSSAL — Hypabyssal and shallow dykes, sills, laccoliths, interiors of thick surface flows	RHYOLITE PORPHYRY (QUARTZ PORPHYRY) GRANO PORPHYRY	TRACHYTE PORPHYRY	PHONOLITE PORPHYRY OR LEUCITE PHONOLITE PORPHYRY	QUARTZ LATITE PORPHYRY (DELLENITE PORPHYRY)	LATITE PORPHYRY (TRACHYANDESITE PORPHYRY)	DACITE PORPHYRY	ANDESITE PORPHYRY	DIABASE (Rarely porphyritic) DOLERITE	OLIVINE DIABASE	THERALITE ESSEXITE			
Deep-seated dykes and laccoliths as well as border zones of larger intrusive masses. Composition same as that of related granitic rock	GRANITE PORPHYRY GRANOPHYRE	SYENITE PORPHYRY	NEPHELINE SYENITE PORPHYRY OR LEUCITE SYENITE PORPHYRY	QUARTZ MONZONITE PORPHYRY (ADAMELLITE PORPHYRY)	MONZONITE PORPHYRY	QUARTZ DIORITE PORPHYRY (TONALITE PORPHYRY)	DIORITE PORPHYRY	DIABASE (Rarely porphyritic) DOLERITE	OLIVINE DIABASE	THERALITE ESSEXITE	IJOLITE MISSOURITE	PYROXENITE HORNBLENDITE (Rarely porphyritic)	PERIDOTITE PICRITE DUNITE
PLUTONIC — Deep-seated dykes in part hypabyssal (esp. lamprophyres) Acidic and basic differentiates (segregations) from parent magma — APLITES (Acidic segregations)	APLITE	SYENITE APLITE BOSTONITE	NEPHELINE SYENITE APLITE	QUARTZ MONZONITE APLITE (ADAMELLITE APLITE)	MONZONITE APLITE	MALCHITE	DIORITE APLITE	GABBRO APLITE NORITE APLITE BEERBACHITE	OLIVINE GABBRO APLITE				
Mainly associated with granites, syenites, monzonites and diorites — LAMPROPHYRES (Basic segregations)	LAMPROPHYRE	MINETTE VOGESITE				QUARTZ KERSANTITE	KERSANTITE SPESSARTITE CAMPTONITE	KERSANTITE SPESSARTITE ODINITE	OLIVINE KERSANTITE		FOURCHITE MONCHIQUITE		ALNOITE
Deep-seated dykes and irregular masses of all sizes, related to large intrusive bodies, where concentrations of gases and vapours were present during solidification	GRANITE PEGMATITE	SYENITE PEGMATITE	NEPHELINE SYENITE PEGMATITE	QUARTZ MONZONITE PEGMATITE (ADAMELLITE PEGMATITE)	MONZONITE PEGMATITE	QUARTZ DIORITE PEGMATITE (TONALITE PEGMATITE)	DIORITE PEGMATITE	GABBRO PEGMATITE NORITE PEGMATITE	OLIVINE GABBRO PEGMATITE				
Large deep-seated intrusives, such as batholiths, stocks, laccoliths and dykes	GRANITE CHARNOCKITE	SYENITE	NEPHELINE SYENITE (FOYAITE) OR SODALITE SYENITE	QUARTZ MONZONITE (ADAMELLITE)	MONZONITE GRANODIORITE QUARTZ DIORITE (TONALITE)		DIORITE	GABBRO ENSTATITE NORITE ANORTHOSITE	OLIVINE GABBRO OLIVINE NORITE TROCTOLITE	THERALITE ESSEXITE	IJOLITE MISSOURITE	PYROXENITE HORNBLENDITE	PERIDOTITE DUNITE

INTERNATIONAL SYSTEM OF UNITS (SI UNITS)

Base Units

QUANTITY	UNIT	SYMBOL
Length	metre	m
Mass	kilogram	kg
Time	second	s
Electric current	ampere	A
Thermodynamic temperature	kelvin	K
Luminous intensity	candela	cd
Amount of substance	mole	mol

Supplementary Units

QUANTITY	UNIT	SYMBOL
Plane angle	radian	rad
Solid angle	steradian	sr

Derived Units

QUANTITY	UNIT	SYMBOL	DEFINITION
Force	newton	N	1 N = 1 $kg.m/s^2$
Energy	joule	J	1 J = 1 N.m
Power	watt	W	1 W = 1 J/s
Flux	weber	Wb	1 Wb = 1 V.s
Flux density	tesla	T	1 T = 1 Wb/m^2
Frequency	hertz	Hz	1 Hz = 1 c/s (s^{-1})
Electric conductance	siemens	S	1 S = 1 A/V
Electromotive force	volt	V	1 V = 1 W/A
Pressure, stress	pascal	Pa	1 Pa = 1 N/m^2

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